BULLETIN OF THE
SCHOOL OF EDUCATION
INDIANA UNIVERSITY

Vol. III BLOOMINGTON, INDIANA No. 3

JANUARY, 1927

Entered as second-class mail matter, September 30, 1924, at the postoffice at Bloomington, Indiana, under the Act of August 24, 1912. Published six times a year, from the University Office, Bloomington, Indiana.

Index Numbers in School Administration

By

HAROLD FLORIAN CLARK, Ph.D.
Professor of Education, Indiana University

Bureau of Cooperative Research, Indiana University School of Education
HENRY LESTER SMITH, Director

Price, 50 cents. For Sale by the University Bookstore, Bloomington, Ind.

A limited number of copies of this bulletin will be distributed free of charge to citizens of Indiana.

BULLETIN OF THE SCHOOL OF
EDUCATION, INDIANA UNIVERSITY

Index Numbers in School Administration

By

HAROLD FLORIAN CLARK, Ph.D.
Professor of Education, Indiana University

Published by the

BUREAU OF COÖPERATIVE RESEARCH

INDIANA UNIVERSITY

Table of Contents

		Page
Introduction—		
	Purpose of the Bulletin	5
	Definition, Need, and Advantage of Index Numbers	5
	Former Index Numbers in School Work	6
	Index Numbers in Other Fields	7
	Future of Index Numbers	9
I.	An Index of the Prices of School Bonds—	
	Need and Purpose of the Index	9
	How the Index Is Made	10
	Use and Advantages	12
	The Index	13
	Results and Conclusions	18
II.	An Index Number of the Prices of School Buildings—	
	Need and Purpose of the Index	18
	What the Index Is and How It Is Made	19
	Materials Used	19
	Labor	21
	Results and Conclusions	21
III.	An Index of the Prices of School Supplies—	
	Need and Purpose of the Index	25
	How the Index Is Made	26
	The Index	27
	Results and Conclusions	32

Charts

		Page
Chart I.	Average Yield of all School Bonds Sold During the Month	14
Chart II.	Index of Prices of School Building Material	22
Chart III.	Index of the Cost of Labor on School Buildings	23
Chart IV.	Index of the Cost of School Buildings	24

Acknowledgment

THE author is under deep obligation to a great many people in connection with this bulletin. The debt to that long list of pioneers in index numbers, both in Europe and in this country, will be obvious to those who are familiar with the development of index numbers. The debt of the author is especially great to his teacher, A. L. Bowley, and to Wesley C. Mitchell and Irving Fisher for their writings.

Mrs. W. H. Sumrall rendered faithful service in obtaining the information in connection with the "Index of School Bond Prices"; Mr. E. A. Johnson with great skill and insight carried the "Index of Prices of School Buildings" from an early stage to its present condition; and Mr. B. F. Cox made substantial contributions to the "Index of the Prices of School Supplies."

As this is the last of a more or less related series of bulletins dealing with various economic and financial aspects of education, it may not be out of place to express my thanks to President William Lowe Bryan and to the Director of the Bureau of Coöperative Research, Dr. Henry Lester Smith, who have lightened my teaching load and have in many other ways made the research possible.

H. F. C.

Bloomington, Indiana,
August 1, 1928.

2—43716

Editor's Note

DUE to the fact that, up to the present time, no study has been published as Number 3, Volume III, of the series of *Bulletins of the School of Education, Indiana University*, this study has been given that number. However, this has caused a discrepancy in respect to the date, the date of publication of the bulletin being given as January, 1927, while the study was made in the summer of 1928. Other studies made by Dr. Clark in the field of public school finance, and published as a part of this series of bulletins, have appeared previous to this study even tho the dates on the bulletins do not show this to be the case.

H. L. Smith

Director

Index Numbers in School Administration

INTRODUCTION

Purpose of the Bulletin. The purpose of this bulletin is to suggest ways in which index numbers may be used in educational administration. Substantial progress has been made in the scientific study of education in the last few decades. The development of standard measuring devices has played no small part in this progress. Among the measuring devices which have been used with great success in other fields, there is one that has not been applied in any systematic form in education. The following pages will point out some of the ways in which this device, an index number, can be used as an aid in the field of educational administration.

Definition, Need, and Advantage of Index Numbers. An index number may be defined in a very general way as a ratio of averages or an average of ratios depending upon the kind of index numbers used.[1] From the standpoint of use, an index number might be defined as a means of measuring changes in price, quantity, or similar items from time to time or place to place. A more simple definition of a price index would be that an index number of prices is an average of prices compared with some standard.

The following illustration from the field of prices may help to make clear the need for index numbers in estimating price changes.

The price of butter was 29 cents per pound in 1913 and 48 cents per pound in 1918. The price of rubber was 80 cents in 1913 and 54 cents in 1918. Were prices higher in 1918 than in 1913? How much higher? If we based our judgment upon the price of butter we would say prices were very much higher in 1918 than in 1913. On the other hand, if we based our opinion on the price of rubber, we would say prices were lower in 1918 than in 1913. Since the result depends upon the commodity we take, it is clear that taking the price of one commodity is not a very satisfactory way to answer our problem as to whether prices were higher in 1918 than in 1913. We might take more commodities. Cotton, for instance, sold at 12 cents per pound in 1913 and 31 cents per pound in 1918. The price of each of the commodities named is changing at a different rate. The same would be true even if we took a great many more commodities. For this reason we cannot take the price of any one commodity as a measure of the changes in price. We must find some way of averaging all the prices. When we average these prices properly we are making index numbers. An index number of prices, then, is simply a proper average of prices. Mathematicians, statisticians, and economists tried for many years to find this proper method. We now know what the proper method is.

[1] Anyone interested in an adequate discussion of the nature of index numbers should consult Irving Fisher, *The Making of Index Numbers*, Houghton, Mifflin Co., 1922.

The result is that, as Irving Fisher says, we can measure price changes more accurately than your grocer can weigh the potatoes you buy from him.

It is so important for the business man to know whether prices are going up or down that even the daily newspapers are now publishing index numbers of prices. In many of the newspapers of the country each Monday morning there is given an index of wholesale prices for the previous week. The need of index numbers by the school man is just as great as is the need of such numbers by the business man.

In the field of prices of school materials, for instance, school men have had no adequate guidance as to the general direction of the movement of prices. With proper index numbers available the school man would have definite numerical answers to many problems regarding which he must make rough estimates at the present time. Are the prices of instructional supplies higher than they were a year ago? Are prices moving up or down at the present time? Are prices likely to be higher? The ordinary school man does not know. A good index number of the prices of instructional supplies would answer these questions and many others. Such an index should be available each month.

Are the prices of school bonds going up or down? Are school bonds selling for more than they were six months ago? What are the factors that indicate lower school bond prices? How far ahead and with what degree of certainty do they operate? An index of the prices of school bonds would make possible the answer to these questions.

Does it cost more to build a school building now than it did a year ago? Is the present a good time to build school buildings or will prices probably go down? The answer to these and many other questions would be indicated by a good index of the price of school buildings.

Former Index Numbers in School Work. One would not expect a technique having as many obvious advantages as index numbers to have been completely ignored in the field of education. There have been occasional suggestions and attempts to apply index numbers to school problems. However, up to the present time there has been no systematic attempt to do so. Reference is made below to a few valuable pioneer attempts that have been made to apply index numbers to school problems.

Leonard P. Ayres, in 1920, published *An Index Number for State School Systems*[2] in which he says, "This volume presents an index number for measuring the effectiveness of state school systems. It is a composite of ten different elements of which five are measurers of the amount of education received by the children, and the remaining five are measurers of the expenditure made to purchase this education."

W. Randolph Burgess, in 1920, wrote *Trends of School Costs*[3] which is built largely upon index number technique. He has the following to say regarding his method: "The method used in computing these figures for the salaries of county teachers is that of the index number. It is desirable to comment at this point on the characteristics of the

[2] Russell Sage Foundation, 1920.

[3] Russell Sage Foundation, Educational Monograph, 1920.

method because it will be used elsewhere thruout the book to measure the trend of wages and of prices. The index number, as a statistical device, is especially adapted to this particular purpose. The method of procedure in this instance was to secure and tabulate the figures for the average weekly salaries of women teachers in twenty rural counties. . . . To secure the index number, a simple average was taken of the figures from twenty counties for each year. Because of the constant use of the same counties any change which appeared in the series from year to year was due, not to a change in the number or kind of quotations, but almost certainly to some real change in the level of teacher salaries."

John K. Norton, in his book, *The Ability of the States to Support Education*[4], uses a form of index number to measure the ability of the state to support education. A previous study by the author,[5] entitled *The Effect of Population Upon Ability to Support Education*, uses a form of index number. There have been a great many attempts to interpret the increasing amount of money spent for education in terms of some general index number of prices. Other studies have applied the index number to various other aspects of educational procedure. In the *American School Board Journal* and in a few other educational journals several short articles and some discussions of the use of index numbers in the solution of educational problems have appeared.

Compared with the mass of material on index numbers in economics, the above material is very meager. A very brief reference to index numbers in other fields will suggest their untouched possibilities for education.

Index Numbers in Other Fields. Irving Fisher[6] has this to say regarding the use of index numbers: "Thirty years ago only wholesale price indexes were used and even these were not as numerous, as widely known, or as widely used as today, when so many official agencies and so many trade journals publish them. Index numbers of retail prices, of wages, and of the prices or sales of stocks were rarities, if not curiosities. Today these are common. In Great Britain alone, three million laborers have their wages regulated annually by an index number of retail prices. We have numerous index numbers of the stock market, even in daily papers. We now have also index numbers of the cost of living, of the minimum of subsistence, and of wages in terms of that minimum. Good index numbers of the quantities of goods produced, consumed, or exchanged are also comparatively new. Beginning with the crude efforts of Rawson-Rawson a generation ago, Kemmerer in 1907, and myself in 1911, such index numbers have in the past few years come to have considerable statistical value, and are even becoming differentiated into indexes of production, manufacture, crops, national income, imports, exports, barometers of trade, etc. Another recent application of index numbers, now current in at least five countries, is that of measuring the trend of the foreign exchanges.

[4] The National Education Association, 1926.

[5] Clark, Harold F., "The Effect of Population upon Ability to Support Education," *Bulletin of the School of Education*, Indiana University, Vol. II, No. 5. 1925.

[6] Fisher, Irving, *The Making of Index Numbers*, p. 367.

"One of the most interesting recent developments is the application of index numbers to special industries, such as lumber or building (e.g., the Aberthaw index of the cost of a cement building), or even to special departments in an individual business (e.g., the price of textbooks of Henry Holt and Company). When the business statistician begins to realize the usefulness of this device in his own business, index numbers will be found sprouting, right and left, to serve the purposes of trade journals, of railways, insurance companies, banks, commercial houses, and large corporations. Their usefulness will be greatly enhanced when the wrong formulae (especially Formula I) now generally used are replaced by right ones."

The following is from a statement recently appearing in the *American School Board Journal*[7] and suggests different uses of index numbers in business:

"Do modern business men have any interest in index numbers? Possibly an answer can be obtained by looking at the business and financial journals which business men read.

"The latest issue of one of the leading weekly financial journals was examined to see if it contained any index numbers. Among the indexes the following were found: an index of industrial stock prices; an index of average bond yields; a weekly index of wholesale commodity prices; a weekly index of sensitive commodity prices; and an index of municipal bridge costs. All the indexes except the last appear each week.

"A recent issue of the Federal Reserve Bulletin, issued by the Board of the Federal Reserve Banks, contained the following indexes among others: index of production of manufacturers and minerals, of wholesale prices by commodity groups, of prices of farm products, of security prices, of factory employment, of payrolls, of freight car loadings, of wholesale trade, of department store sales, of department store stocks, and many others. There are many sub-indexes under some of the items. For instance, under manufacturers there are over fifty indexes of special items, under payrolls ten separate items.

"A recent issue of an important daily financial journal contained the following index numbers: index of prices of railroad stocks, of industrial stocks, and of bonds.

"The index numbers in these three journals are illustrative of a much larger number that could be given. Almost any technical, trade, or financial journal has one or more index numbers today. Although most of the illustrations of index numbers given alone are confined to measuring changes in prices, prices are only one of the many things to which they can be applied.

"The list of index numbers above, taken from the *Federal Reserve Bulletin*, gives an idea of some of the fields other than prices to which index numbers can be applied.

"It is important for business men to know if prices are higher or lower than they were. Index numbers of prices give the answer. At

[7] Clark, Harold F., "An Index Number of School Bond Prices," *American School Board Journal*, August, 1928.

times business men want to know if wages are higher or lower than they were. Index numbers of wages give the answer.

"As business men demand more definite information, index numbers are made to provide that information. Will school men fall behind or will they learn to use index numbers?"

Future of Index Numbers. This bulletin gives a very brief discussion of the application of index numbers to three different phases of school administration: first, school bonds; second, school buildings; third, school supplies. These three indexes are only illustrations of a very much larger number of indexes that should be available. They are presented only as preliminary samples of the work that needs to be done.

The whole range of prices of school materials and service should be covered by index numbers. Adequate index numbers should be available for teachers' salaries. They should show the smallest change in money salaries. Salaries in dollars should be compared with changes in cost of living for a teacher and should be expressed in yearly, monthly, and daily amounts. The results could then be directly compared with wages in other occupations and with earnings of other people of similar training and ability. An index of the cost of a given type of education should be made.

There are many other phases of school work in addition to cost where index numbers might prove valuable. In the whole field of measuring instruction and scholarship, measuring and reporting health, reporting teacher and janitor efficiency, and in many other phases of school administration, index numbers might be used. The future holds great promise in the use of index numbers, and the three illustrations given in this bulletin are primarily to arouse interest and create discussion rather than to present final solutions of the problems.

AN INDEX OF THE PRICES OF SCHOOL BONDS

Need and Purpose of the Index. Every year about $300,000,000 worth of school bonds are sold in this country. Is it important that they be sold to the best advantage so that adequate schoolhouses, playgrounds, and school equipment can be provided? Do the schools need to obtain their capital outlay money advantageously? To ask the question is to answer it in the affirmative. If it is necessary to sell school bonds wisely, then it is necessary to know something of the changes in school bond prices.

According to the best estimates available, the average interest rate on all school bonds outstanding (July, 1928) was 4.64 per cent. There are hundreds of millions of dollars' worth of school bonds carrying 5 per cent interest or more. If an index of school bond prices had been available when these bonds were issued, it would have shown the necessity of inserting a callable feature in the bonds so that later the bonds could have been called and re-issued at a lower interest rate.

Many school boards do not know within 1 per cent what interest rate school bonds should carry. During the past month (July, 1928)

school bonds of financially sound districts have been issued carrying 5.5 per cent or even 6 per cent interest. Sometimes the school district gets a part of this back in a higher premium, but it is highly improbable that all of it is returned by this process. Even with these high interest rates, sometimes little or no premium is received when the bonds are issued by financially sound school districts. If an index of school bond prices does nothing else, it at least would enable school boards to know what is the current rate of interest being paid on school bonds. This alone should produce enormous savings to the school boards, taking the country as a whole.

School bond prices change. How then can such changes be expressed in a form simple enough that the school man can use it? As has been stated on a previous page, there have been developed index numbers or measuring devices for wholesale prices, for wages, and for many other things. The Bureau of Labor Statistics alone gives index prices for 550 commodities. There are such indexes in the general financial world; indexes of stock market prices, of bond prices, of interest rates, and of other items being available. For a long time there has been a pressing need for an index of school bond prices.

How the Index Is Made. How could such an index of school bond prices be made? First, it would be necessary to get a record of all school bonds sold in the United States. The important thing is the interest rate and price paid so that the net interest rate can be calculated. It is easy to obtain the amount of the sale for most sales and very easy to obtain complete details for the larger issues. The financial journals and ordinary papers will carry notices of most of the issues. But if no other issues were included, the small places, which it is very important to include, would be left out. This necessitates making special provision to get information about school bond sales in small communities.

After the net interest rate has been determined, the next thing is to weigh the issues according to their size. This gives the weighted net interest rate for all school bonds sold during the period under discussion. If this is calculated each month we have a weighted index number of school bond prices. However, the fact that the school man has the index of interest rate alone is not enough to guide him in issuing school bonds. He should have supplementary information to go with the index. The following information[1] is being supplied each month along with the index of net interest yield. The following are the factors included with the index:

"I. Present facts and conditions.

1. Average yield of all school bonds sold during the month.

This shows the school official immediately what is the prevailing rate of interest on school bonds, and would call for an explanation if the rate on a proposed issue were much higher. It is an approximate norm by which school bond rates can be judged.

[1] The information mentioned is supplied with the index of school bond prices which is published each month by the author of this bulletin in the *American School Board Journal*. The material is quoted as it was prepared for the first issue of the index.

2. Miscellaneous factors on school and municipal and federal bonds.
   (*a*) School bonds sold during the month.
   (*b*) School bonds sold during the year to date.

   These two items enable the school official to judge what others are doing in regard to issuing school bonds.

   (*c*) All municipal securities sold during the month.
   (*d*) All municipal securities sold during the year to date.

   By enabling the school officials to make comparison between total school and total municipal issue, additional light may be thrown upon the desirability of issuing school bonds at this time.

   (*e*) All school bonds outstanding (estimated). (Estimate may be in error by as much as $250,000,000.)
   (*f*) Average yield of all school bonds outstanding.

   Items *e* and *f* must be estimated; they are inserted for the purpose of comparison with amounts now being issued and current rate.

   (*g*) Yield of bonds of ten large cities sold during the month.

   This is a very valuable item for comparison. The larger cities should try to keep their interest on school bonds as much under this as possible.

   (*h*) Yield of United States long-term bonds.

   This furnishes a rate to be striven for in issuing school bonds. A school issue cannot go below this except due to some local and probably temporary cause. Even then it will probably be partly due to the ignorance of investors as to the net yield to be obtained from government bonds. An occasional issue has sold below this point.

II. Past facts.
   1. Bond sales, school, municipal, all public and private, and rate of yield for several years past.

      This is valuable in indicating the approximate interest rates school bonds should carry.

   2. Average yield of long-term federal government bonds.

      This is a good measure of a pure interest rate—the interest obtained on money when little or no risk is involved. It is the lower limit of interest to aim at when selling school bonds. When this rate drops, the interest rate on school bonds should drop.

   3. Security prices.

      The price of stocks and bonds in general should be of advantage in helping the school official estimate the probable trend of school bond prices.

   4. Index number of wholesale prices, all commodities, and building materials.

      Changes in wholesale prices are important in throwing light upon probable changes in business and bond prices. As a major portion of a school bond issue is spent for capital outlay, the price of building materials is an important consideration in estimating when to issue school bonds.

III. Future trends.

1. What the facts show.

Certain formulas are being worked out based upon the factors that have predicted changes in school bond prices in the past. These formulas will be used to make predictions regarding the trend of school bond prices in the next thirty, sixty, or ninety days.

2. Opinion and advice.

In this section the predictions from the above formulas will be modified in the light of all available current financial data and an opinion given as to the probable trend of school bond prices. From time to time practical suggestions will be made in regard to improving the financial procedure of school, particularly as it relates to bonds."

Use and Advantages. The additional factors which are presented along with the index of school bond prices should enable the school man to sell school bonds with much better results.

What kind of facts would we expect such an index to give to the school man? Some of the facts are mentioned in the following paragraphs. A year ago no one knew exactly what the price of school bonds was, nor did anyone know in more than a general way what was the prevailing net interest. Since January, 1928, an index of school bond prices has been published each month in the *American School Board Journal*. From the index one can see at a glance that last September (1927) school bonds sold to yield 4.58 per cent, and that in January of this year (1928) the price of school bonds had changed so that the average school bond carried only 4.29 per cent interest. By the first week in April there had been a further change, so that the average interest rate on school bonds was only 4.02 per cent.

In this series of articles the average rate of interest on school bonds has been calculated for each month for the past few years. As an illustration, take the month of March. In 1928 the average yield of school bonds sold in March was 4.18 per cent, the lowest average interest rate since long before the World War. The rate in March, 1926, was 4.73 per cent; in March, 1924, it was 4.92 per cent; in March, 1922, 5.00 per cent; and in March, 1921, school bonds sold on an average interest rate of 5.79 per cent, the highest interest for many, many years. In March, 1920, the rate was 5.43 per cent. It would be possible to go on back the same way for any month. With such a table before him giving the interest rates of school bonds for each month, the superintendent is in a position to issue school bonds much more intelligently than he can at the present time. The table showing the interest rate of school bonds is included, along with other material, in the index of school bond prices.

Along with the average interest rate at which school bonds were sold each month, there is presented the amount of the bonds sold. The sales in March are given for a few years for purposes of comparison. In March, 1928, $18,854,360 worth of school bonds were sold; in March, 1926, $19,439,400; in March, 1924, $14,170,587; in March, 1922,

$14,012,641; in March, 1920, $4,381,250; and in March, 1910, only $2,243,550 worth were sold. The growth in the sale of school bonds is evident: 2 million in 1910, 9 million in 1920, and 18 million in 1928. Of course these figures mean little without figures showing the growth in volume of other kinds of bonds and stock, and growth in general financial activity. Time prevents giving the other figures in this presentation.

The plans have been to develop a series of state indexes along with the national index of school bond prices. General interest rates vary somewhat among the different states. Whether that variation is enough to account for the difference in the state indexes of school bonds is not definitely determined yet. This is a problem on which a great deal of time and thought is being spent at present.

Altho the national index of school bond prices should be of great value to school men, the national index supplemented by the state indexes should be of much greater value. The state indexes will give the average net yield of all school bonds sold in any state in the Union during the previous month. During a recent month (in 1928), for instance, we find the state indexes varying all the way from 3.69 in Massachusetts to 5.91 in Florida. This means that the average net interest on all school bonds sold that month in Massachusetts was 3.69 per cent while during the same month, Florida school districts paid on the average 5.91 per cent interest on school bonds.

The regular school bond index is an index of the price of long-term school bonds. The schools of the country each year borrow millions and tens of millions of dollars for short periods. In the past they have had no guidance as to what rate of interest should be paid on these short-term loans. School boards do not know whether short-term loans should carry a higher or lower rate of interest than long-term loans. For that reason there is being developed an index of short-term loans. It shows very definitely that school boards should be paying less for short-term loans than they are paying for the long-term bonds at many periods. The opposite is usually the case. The small place usually pays a higher interest rate on the short-term loan than on the long-term loan. This is contrary to the commercial rates on such loans much of the time, and the information in our index should enable school boards to make a substantial savings on their short-term loans.

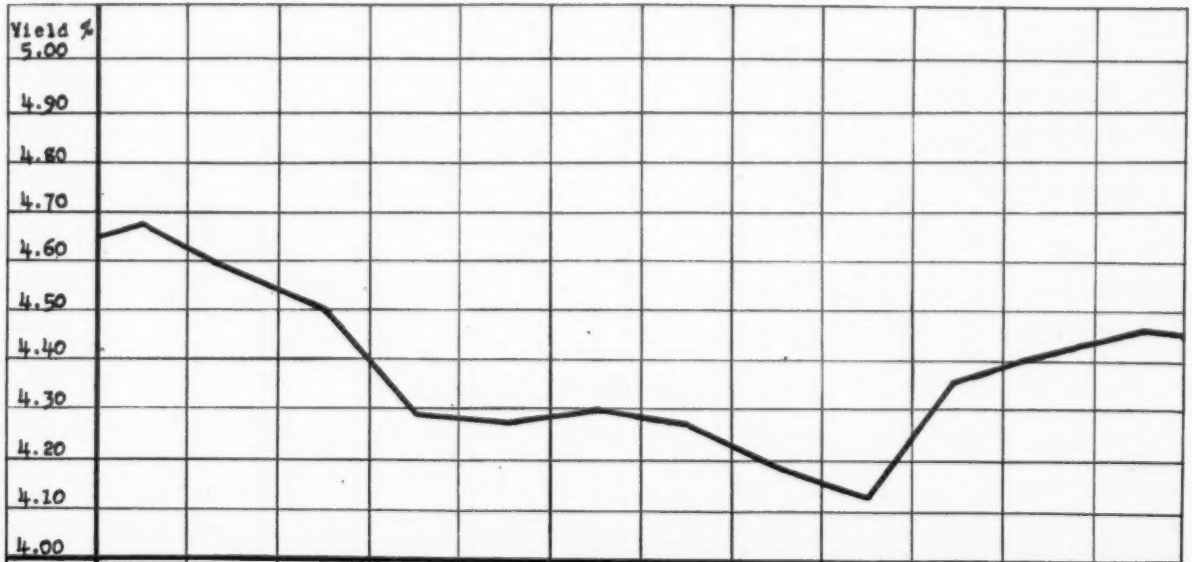
The Index. One of the monthly indexes, with the supplementary material, is given below to show the form in which the index appears.

"INDEX OF SCHOOL-BOND PRICES[2]

Harold F. Clark, Teachers College, Columbia University, New York, N.Y.

"The net interest rate on all school bonds sold in July was 4.45 per cent. This is the highest rate for any month in the year 1928 and is almost up to the average rate for the entire year of 1927. The rate for July is .03 of one per cent higher than the rate for June. The net

[2] Copyright by Harold F. Clark. Published in the *American School Board Journal*, September, 1928.



Month	1927 Aug.	Sept.	Oct.	Nov.	Dec.	1928 Jan.	Feb.	Mar.	Apr.	May	June	July
Rate	4.67	4.58	4.50	4.28	4.27	4.29	4.26	4.18	4.13	4.35	4.42	4.45

CHART I. AVERAGE YIELD OF ALL SCHOOL BONDS SOLD DURING THE MONTH

interest rate on all school bonds sold in April was the lowest of the year, 4.13 per cent. Each month since April has shown an increase. The total increase in the net interest rate during May, June, and July amounts to .32 of one per cent. As was suggested last month, the rate of increase cannot go on indefinitely.

"What the rate of interest on school bonds will be in the near future depends almost entirely upon the Federal reserve banks. Back in the early part of the year, the rediscount rate of the Federal reserve banks was 3.5 per cent. The net rate of interest on school bonds was approaching within one-half of one per cent of this rate. The Federal reserve banks raised the rediscount rate from 3.5 to 4.0 per cent. This was raised to 4.5 per cent and finally to 5.0 per cent. The result was a rise in all kinds of interest rates. The inevitable result was that interest rates on school bonds went up with other interest rates. If the Federal reserve banks raise the rediscount rate again from 5.0 to 5.5 per cent, interest rates on school bonds will doubtless go up. On the other hand, if the Federal reserve banks lower the rediscount rate, as they must do sooner or later, the interest rate on school bonds will fall. Any opinion as to what the Federal reserve banks will do in the near future is more or less of a guess. But, if brokers' loans and loans against stock-exchange collateral can be reduced, it would not be unreasonable to expect the Federal reserve banks to lower the rediscount rate by fall or early winter.

"TABLE I

AMOUNTS AND YIELDS OF BOND ISSUES[3]

	July, 1928
1. School bonds sold during the month	$15,697,225
2. All municipal securities sold during the year (to date)	878,374,000
3. All school bonds outstanding (estimated)	3,342,000,000
4. Average yield of all school bonds outstanding (estimated)	4.64%
5. Yield of school bonds of the ten larger cities sold during the month	4.36%
6. Yield of United States long-term bonds (quotation the middle of May)	3.44%

"As is evident from the high interest rates that must be paid, the present is not a particularly good time to issue school bonds. Even though interest rates on short-time loans are higher at present than interest rates on long-term bonds, it would doubtless pay many cities to issue the short-term loans now and wait until interest rates are lower before issuing the long-term bonds.

"The high bond issue in July sold for 6.24 per cent and the low issue sold for only 3.93 per cent. Only a few issues sold during the month for less than 4.0 per cent interest. Some weeks in the early spring almost half of the issues were selling for less than 4.0 per cent. When such

[3] The monthly total of school bonds does not include all the bonds issued in the month, due to the difficulty of obtaining the yields on some of the issues.

large cities as Cleveland and Los Angeles are reported as having paid 4.36 per cent interest on bonds, interest rates are high. A few months ago such cities were selling their bonds around 3.90 and 3.95 per cent.

"The total amount of school bonds sold during July was $15,697,225. This amount is less than the average monthly sales for the year. The high interest rates have doubtless been partly responsible for holding down the amount of the sales.

"The state indexes showed slightly more than the usual variation during July. The school bonds sold in Massachusetts carried a net interest rate of less than 4 per cent. The bonds sold in Florida carried a net interest rate of about 6 per cent.

"Sometimes the impression is given that school-bond sales are a major part of the total municipal-bond sales. But, the total school-bond sales during the year to date are only about $125,000,000 as compared with total municipal-bond sales of almost $900,000,000.

"Table III shows the rise in interest rate on long-term Federal government bonds. The preliminary estimate of the rate for July is the highest for the past twelve months. The recent government issue of bonds bearing 3⅝ per cent interest has been selling at a decided discount. Table IV shows that the average prices of stocks have remained fairly constant since June.

"Commercial bonds have fallen in price, which, of course, means a higher yield. As will be seen, the average yield of sixty high-grade commercial and industrial bonds is only .08 of one per cent higher than our index of school-bond yields..

"Table V shows that commodity prices show some tendency to rise over the past two or three months. This is especially true of the prices of building materials.

"TABLE II

Year	Bond Sales[a]			Average Rate at Which Bonds Were Sold	
	School	Municipal	All Public and Private	Year	Munic.
1927.....	$274,000,000[b]	$1,450,000,000[b]	$7,735,000,000[b]	1927	4.47[b]
1926.....	260,000,000	1,365,000,000	6,311,000,000	1926	4.61
1925.....	323,000,000	1,399,000,000	6,223,000,000	1925	4.58
1924.....	288,000,000	1,398,000,000	5,593,000,000	1924	4.26
1923.....	208,000,000	1,063,000,000	4,303,000,000	1923	4.76
1922.....	237,000,000	1,101,000,000	4,313,000,000	1922	4.81
1921.....	215,000,000	1,208,000,000	3,576,000,000	1921	5.18
1920.....	130,000,000	683,000,000	3,634,000,000	1920	5.12
1919.....	103,000,000	691,000,000	3,588,000,000	1919	5.04
1918.....	41,000,000	296,000,000	14,368,000,000	1918	4.90
1917.....	60,000,000	451,000,000	9,984,000,000	1917	4.58
1916.....	70,000,000	457,000,000	5,032,000,000	1916	4.18
1915.....	81,000,000	498,000,000	5,275,000,000	1915	4.58
1914.....	42,000,000	320,000,000	2,400,000,000	1914	4.38

[a]By special permission based upon sales reported by the *Commercial and Financial Chronicle.*
[b]Not final.

"TABLE III—AVERAGE YIELD OF LONG TERM FEDERAL-GOVERNMENT BONDS[6]

Past Twelve Months

1928

Month	Rate Per Cent
August	3.46[7]
July	3.48[7]
June	3.40
May	3.35
April	3.32
March	3.30
February	3.36
January	3.35

1927

December	3.34
November	3.39
October	3.43
September	3.44

Past Five Years

Year	Rate Per Cent
1927	3.464
1926	3.544
1925	3.797
1924	4.010
1923	4.298
1922	4.301

[6]Taken from the *Federal Reserve Bulletin.*
[7]Calculated from the New York Stock Exchange quotations and not the final Federal Reserve Board average

"TABLE IV—SECURITY PRICES AND YIELDS[8]

Date	Average Price of 228 Stocks	Average Price of 60 Bonds	Average Yield on 60 High-Grade Bonds
1928			
August	211.3[9]	98.3[9]	4.52[9]
July	210.1[9]	98.2[9]	4.53[9]
June	210.2	98.5	4.50
May	221.8	99.7	4.42
April	215.2	100.3	4.38
March	203.0	100.5	4.37
February	191.9	100.3	4.38
January	195.6	100.3	4.38
1927			
December	196.5	100.0	4.40
November	189.0	99.7	4.42
October	186.2	99.6	4.43
September	191.1	98.0	4.45

[8]As reported by the Standard Statistics Company, Inc. Used by special permission.
[9]Not final.

"TABLE V—REVISED INDEX NUMBER OF WHOLESALE PRICES[10]

Past Twelve Months			Past Five Years		
Month	All Commodities	Month's Building Materials	Year	All Commodities	Building Materials
1928					
August	98.1[11]	94.2[11]	1927	95.4	93.3
July	98.3[11]	94.1[11]	1926	100.0	100.0
June	97.6	93.9	1925	103.5	101.7
May	98.6	93.5	1924	98.1	102.3
April	97.4	92.5	1923	100.6	108.7
March	96.0	91.0			
February	96.4	91.0			
January	96.3	90.8			
1927					
December	96.8	90.4			
November	96.7	90.2			
October	97.0	91.6			
September	96.5	92.1			

[10]United States Bureau of Labor Statistics, 1926=100.
[11]Not final.

Results and Conclusions. The index will at least provide school men with an accurate instrument to show the changes in school bond prices. This should enable school authorities to sell bonds at much better prices than at present. The index is suggestive of what can be done in the field and its most important result should be to point the way to more accurate measurements of changes in school bond prices.

AN INDEX NUMBER OF THE PRICES OF SCHOOL BUILDINGS

Need and Purpose of the Index. "An index number of the prices of a number of commodities is the average of their price relatives."[1]

Indexes have been used chiefly for measuring the purchasing power of money. The index of the costs of school buildings and school building materials is an index of this type.

School boards and superintendents generally do not know whether building costs are higher now than last month or whether they are higher than at the same time last year. In fact, they have no satisfactory measure of what the conditions in this respect are, but they decide that a school building is needed and without adequate consideration sell bonds and let the contract. If a reliable measure of building prices were in existence, those in charge could, in a scientific and business-like manner, plan building programs so as to save their school corporations large sums of money.

Thru the index, future conditions in building costs can be predicted with great accuracy, because those familiar with the index and those that study and use the index will likewise know and understand the basic conditions underlying the fluctuations.

[1] Fisher, Irving, *The Making of Index Numbers*, p. 3, Introduction. Houghton, Mifflin Co., 1922.

This will cause contractors to bid on a closer margin as soon as they learn to have confidence in the index, and in all probability they will be forced to because school administrators and school boards will be able to know what they should expect of the contractor.

What the Index Is and How It Is Made. The index of the cost of school buildings is an average of the prices of school building materials and the various kinds of labor that are used in the construction of a school building.

The formula used thruout this series of computations is Fisher's Number 2153 which Mr. Fisher says is the nearest to the Ideal Formula, Number 353, of any now in use.

Formula 2153 is given as follows:

$$\text{Index} = \frac{\Sigma\,(q_1+q_0)(p_1)}{\Sigma\,(q_1+q_0)(p_0)}$$

In this formula the substitution for "q" is the per cent which each type of material is of all materials going into a school building or, if used in the labor factor, it represents the per cent which each type of labor is of all labor used in building the structure. "p_1" represents the price of each building material for the given date, while "p_0" represents the price of the same material on the base date. If labor is the factor being used, "p" represents the price of labor. It is obvious that "q" will remain constant thruout the study.

Materials Used. The index of materials should include as large a per cent of the materials that are commonly used in school buildings as is possible because the nearer that the quantity approaches 100 per cent the more accurate will be the final index. The following list of materials was used in this index:

Brick	Common Building
	Face Brick
Concrete Plaster	Cement
	Gravel
	Lime
	Sand
Glass	Plain, Grade A
Hollow Tile	
Lumber	Maple Flooring
	Millwork, Yellow Pine
	Timbers, Yellow Pine
Roofing	Composition, Prepared
Varnish and Paint	Lead
	Linseed Oil
	Turpentine
Steel	Structural Shapes and Metal Lath

It should be noted that the materials are basic in so far as possible rather than being materials that are already assembled.

To determine how nearly the list includes all materials that go into a school building, an analysis of the materials required to construct an average-sized building in each of the following types was made: fire-proof thruout, supporting partitions; fire-proof thruout with non-supporting tile partitions; fire-proof with the exception of floors, with both supporting and non-supporting walls or partitions; non-fire-proof with the exception of fire-proof halls and corridors. In combining the results, it was found that the list included 95.77 per cent of all the materials which are commonly used in a school building, with the exception of buildings made of stone with marble trim.

The materials going into the school building were analyzed to determine what per cent of the total structure was contained in each type of material. The results obtained were checked by finding the total value of each type of material manufactured in the United States as a whole and by calculating what per cent the cost of each material represented of the total cost of all building materials manufactured. It was found that each of the following materials made up the given per cent of the total for all materials going into the structure:

	Per cent	
Brick, common	9.598	
Brick, face	12.846	
Cement	17.54	
Gravel	5.73	
Glass	.8468	
Lumber, plank, timbers	7.587	
Lumber, millwork	6.974	
Lumber, flooring	6.91	
Lime	2.536	
Paint and Varnish—		
Linseed oil	.8	
Lead	.8	
Turpentine	.8	
Roofing	2.752	
Sand	3.43	
Steel, metal lath	12.73	
Tile, partitions	3.897	
Total	95.77	of total structure

Note: The following assumptions were necessary:

(1) The price of any form of roofing will vary in the same proportion as that for prepared composition.

(2) If yellow pine lumber is not used for interior trim, grounds, etc., the change in the price of the other kinds of lumber will vary in proportion to that for yellow pine.

(3) A standard formula for plaster and concrete is used.

(4) Prices of all kinds of glass will vary with the price for single *A* window glass.

(5) Prices of other types of paint materials will vary in proportion to that for the three given materials.

Using the per cents given above in the formula in substitution for "q" and the price quotations given by the United States Bureau in the *Monthly Labor Review* and checked by quotations in the *Chicago Journal of Commerce*, the *Annalist*, and Bradstreet's in substitution for "p," an index can be made as often as price quotations can be obtained.

Labor. Since building materials include only about 55 per cent of the cost of a school building and labor is approximately 40 per cent, leaving the architect's fee at about 5 per cent, this large factor must be considered. A large per cent of the labor cannot be attached to the materials themselves since such work as grading, digging of basement, watchman, etc., does not belong to any type of building material. The items of labor used in this index include 83.29 per cent of all the labor going into a school building, whereas the other 16.71 per cent consists of unskilled labor that will probably vary in proportion to that of the skilled trades.

The index of labor prices is based on the union wage scale of the following building trades: carpenters, brick masons, cement workers, painters, structural steel carpenters, roofers, plasterers, and pipe-fitters. For helpers and assistants in the trades it is assumed that the prices will vary in proportion to that for each of the attached trades.

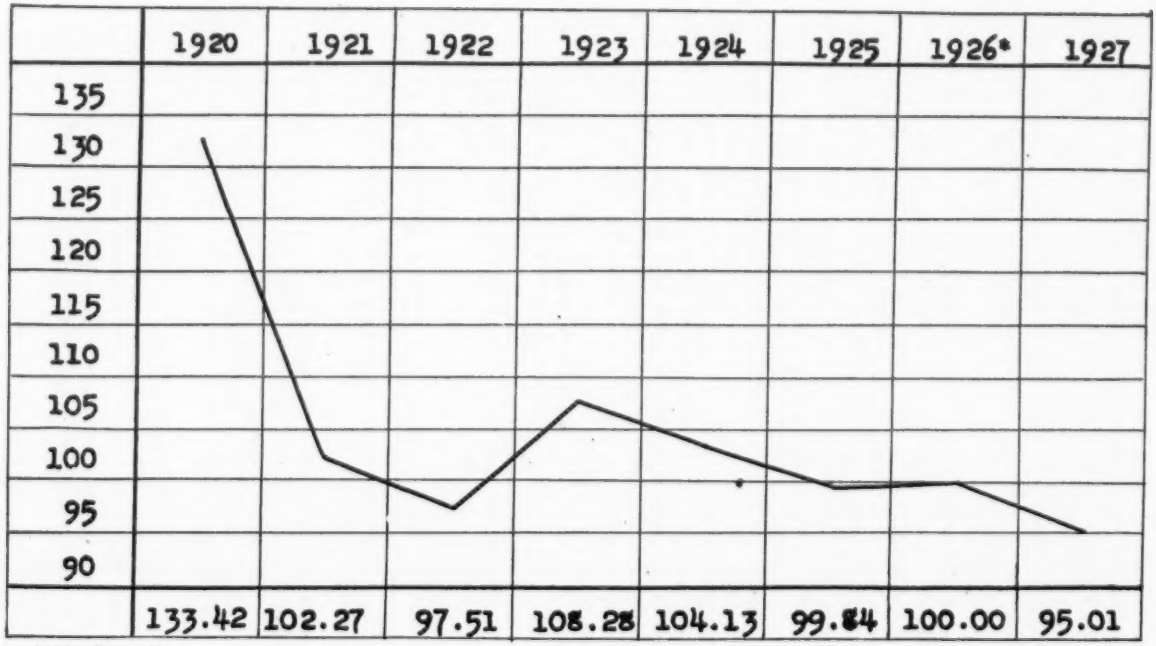
The weightings for each of the forms of labor are based upon the figures of contractors for school buildings and offer a high degree of reliability. As would be expected, carpentry, masonry, and plastering receive the heaviest weighting.

The formula used was Fisher, Number 2153, with the per cents for the various kinds of labor represented by "q" and the price of the various forms of labor represented by "p." The only variable in the formula is "p" and it will remain so unless a different type of building is constructed or different plans for efficiency of labor are used, resulting in the change in the amount. This is not likely to occur in such proportions as to revolutionize the whole contracting cost.

Results and Conclusions. The charts on the following pages show the index in its final form. Chart II shows the price of school building materials for the years from 1920 to 1927. This shows the peak year, 1920, on the 1926 base, with the tremendous drop in prices in 1921 and 1922, and with the second peak in 1923 as an attempt to return to normal conditions.

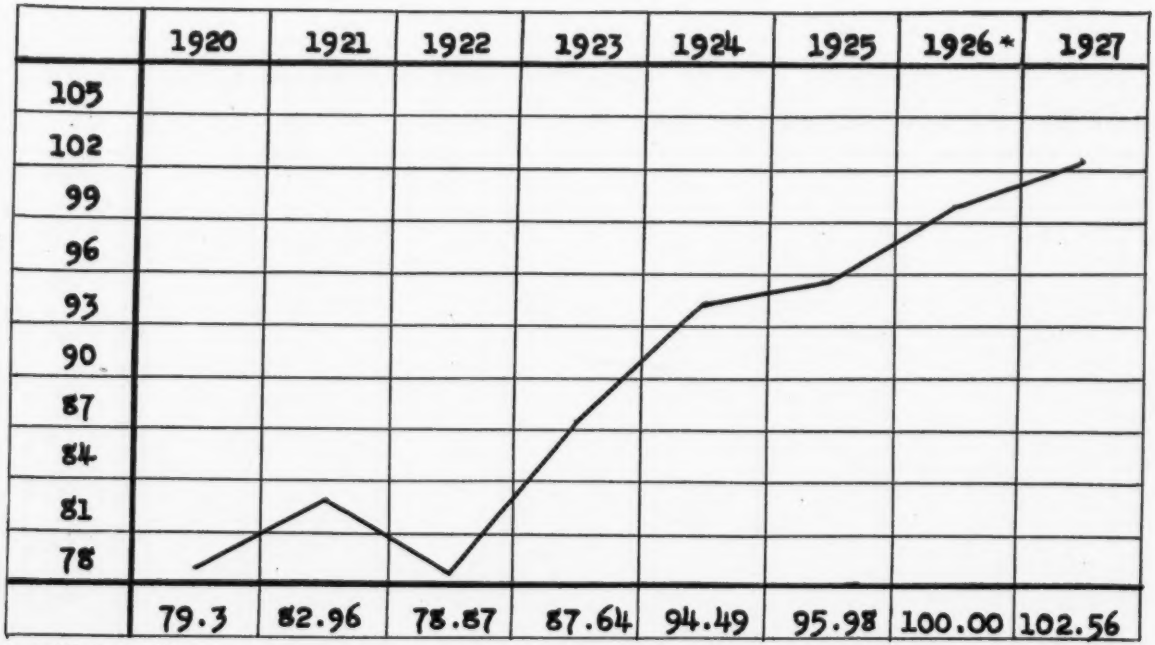
Chart III, on labor prices, shows the relative prices of labor based upon the 1926 base. This shows wages in the building trades to be much higher now than in the years directly following the war. The relation between the figures in Charts II and III is inverse. When these two are united, the resulting index is that of the prices of school buildings as shown in Chart IV.

Chart IV is made from the combined results of Charts II and III, assuming that materials make up 55 per cent of the completed building while labor constitutes 40 per cent and the architect's fee, 5 per cent.



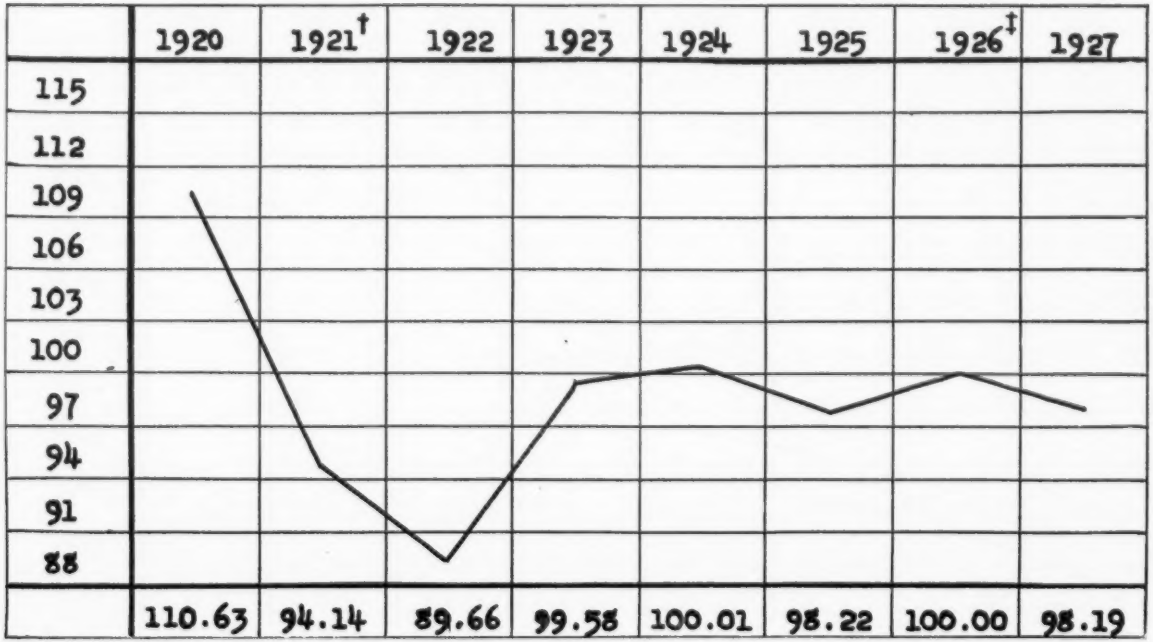
* 1926—Base—100.

CHART II. INDEX OF PRICES OF SCHOOL BUILDING MATERIAL



* 1926—Base—100.

CHART III. INDEX OF THE COST OF LABOR ON SCHOOL BUILDINGS



* Obtained by combining Charts I and II, giving each its proper weighting.

† This index does not take into consideration the profits which contractors may make, neither does it include lower efficiency of labor with which some contractors may be confronted or which is peculiar to some sections of the country.

‡ 1926—Base—100.

CHART IV. INDEX OF THE COST OF SCHOOL BUILDINGS

It is interesting to note that, whereas the index for materials decreased from 133 in 1920 to 95 in 1927, labor increased from 79 in 1920 to 102 in 1927. These fluctuations caused the curve in the index of building prices to be reduced very much since the greatest range of difference was in the early years of the post-war period.

The reliability of the quotations of the Bureau of Labor, which were used in this study, has been assured by comparisons made with those in Bradstreet's, the *Annalist*, and the *Chicago Journal of Commerce*.

Assuming that the technique is sound, the only thing required to insure the greatest degree of accuracy in the index is to increase the number of cases in the different types of buildings. As soon as the value of the index is known by a greater number of people, and the demand of the public becomes sufficiently great, this type of index will appear in the daily and weekly commercial journals. At the present time it would be impossible to issue an index of this kind more often than once a month because the basic data upon which the index is dependent are not available.

The two greatest values of the index are that of giving the status of present conditions with reference to those of the past and that of furnishing a basis for prediction of what will occur in the future.

AN INDEX OF THE PRICES OF SCHOOL SUPPLIES

Need and Purpose of the Index. There is a special need for the index of school supplies in addition to the needs for the two other indexes mentioned in this bulletin. This supply index is needed to aid in making budget estimates. After the quantity of supplies needed for the budget has been scientifically determined, the most difficult question still remains—the cost of the supplies. The time of the year comes when it is necessary to make the budget estimates of the cost of school supplies for the following year. In working out the estimates the business manager may follow what is considered the best procedure by many of our better school systems; that is, he will take his per pupil cost for the past year, add the proper sum for increased enrollment, and assume that this is the proper total amount. This procedure does not consider whether the cost of the supplies is the same this year as it was during the previous year. When the business manager is very careful or when he has plenty of time he may look up the price of each of the commodities. A really good school supply price index would indicate very accurately what changes had occurred in school supply prices. If such an index were available it would save much time in making the estimates of school supply cost and also make the estimates much more accurate.

Even when accurate estimates of school supplies have been made and the preparation of the budget is finished, the business manager or superintendent is still faced with the difficult matter of the execution or carrying out of the budget. When shall the school supplies be bought? If you are buying almost anything else except school supplies you can get expert trade advice about the probable course of prices. Why is it not possible to get such advice about school supplies?

There is not only no way to predict changes in school supply prices, but there is no way to measure changes in such prices. It is not known, except in a general way, whether school supply prices are higher now than they were a year ago, and there is no way to show how much higher they are. Irving Fisher states that it is possible to measure changes in general wholesale prices to within 1 part in 10,000. Why has not someone made an index of school supply prices, even tho it is far less accurate than that?

How the Index is Made. Naturally there are difficulties in making such an index. One can get daily quotations of the prices of cotton, of corn, or of wheat, but there is no source to which one can go and get daily quotations of the prices of school supplies, as such. Of course it would be possible to take prices from the school supply catalogs. The difficulty with this is that the catalogs are issued at best only a few times a year. A further difficulty is that the prices may stay the same in the catalogs thruout the year but the discount offered may vary at different times of the year. Even with all these shortcomings a catalog price index will, without doubt, sometime be made available. Altho a catalog price index would be of value, a school supply price index based upon items, quotations for which could be obtained at frequent intervals, would be better.

Even with all the difficulties that are involved in making the latter type of index, it has been considered of such great help in school budget making that work has been started on such an index. This work has been in progress now for several months.

To be of maximum help the index should also indicate the probable trend of future prices of school supplies. Needless to say, a study of actual prices will not be of much help along that line. What would best help indicate the probable trend of school supply prices? In particular, what would indicate the trend of school supply prices thirty, sixty, or ninety days, or six months in advance? It would have been possible to go entirely outside of the field of school supplies and look for other things that would have indicated changes in the prices of school supplies. For example, it would have been possible to try a general index of wholesale prices and see if it would predict changes in school supply prices. Or some of the retail price indexes could have been tried to see if they would have predicted changes in school supply prices.

Instead of using any of these things, it seemed better to go back to the materials from which the school supplies were made. Of the thirty-four items of school supplies listed by Taylor[1] under "General Control, Office Supplies," eight items, or about 25 per cent of them, are essentially paper in one form or another. A very few other materials account for almost all of the supplies listed. Of the approximately 350 supply items listed by Taylor (not all of which are different) almost all are made from a few materials. The cost of these materials, combined with the cost of the appropriate labor necessary to make the school supplies, should give a very good indication of the change that will occur some time later in school supply prices.

[1] Taylor, Robert Burns. *Principles of School Supply Management.* Monograph. Teachers College, Columbia University, 1926.

How much lag will there be? How long will it take to make changes in prices of materials effective in changes in price of the finished product? It is possible to make some preliminary guesses at this time but it will take another year or two of work before the facts will be known with any high degree of accuracy. If changes in school supply prices follow, say three months after changes in the price of materials, it would be possible to predict the price of school supplies three months in the future. If the index of the price of materials goes down it will indicate that about three months later school supply prices may be expected to fall.

Back of the materials from which school supplies are made lie the basic materials from which the materials are made. As an illustration, back of the paper from which notebooks are made is the wood pulp. Going back from the finished articles the sequence is (1) notebook, (2) paper, (3) woodpulp. By taking the price of the basic materials, we hope to get some kind of crude estimate of what supply prices would be six or nine months later if there were no disturbing factors.

Needless to say, there are a great many of these disturbing factors. A rise or fall of the general price level might throw out of line the prediction of what supply prices would be six months later. As the general price level depends upon both the quantity of goods and the quantity of money in circulation, the general price level is hard to estimate. Fortunately, as far as estimating this factor is concerned, we have to follow the items which influence it fairly closely for another index, the index of school bond prices, which is now being published. All factors considered, it seems that it will be possible to make a substantially accurate estimate of what school supply prices will be some time in advance.

The Index. The index in Table VI is based upon catalog prices. It is made from actual prices of all the important items of school supplies with proper weights given to each item.

TABLE VI—INDEX OF THE PRICE OF SCHOOL SUPPLIES
(1926=100. Based on Catalog Price)

Year	Index	Year	Index
1921	149.71	1926	100.00
1923	105.29	1927	90.73
1924	108.31	1928	88.27
1925	97.35		

The index in Table VII is based upon the price of materials and for that reason gives much greater promise than an index based upon catalog prices. A main advantage is that quotation can be secured each month. The school supplies listed below were studied to see the materials from which they were made.

I. General Control[2].

A. Office Supplies:

Blank books—stenographic
Blotters—large and small
Brushes—show-card and typewriter
Crayons—all kinds
Dermax
"Ditto" rolls
Envelopes—all kinds
Erasers
Folders for filing
Gelatine sheets
Glue, paste, and mucilage
Gummed patches
Ink—all kinds
Labels—gummed and other
Mending tissue
Paper—all kinds (pencil, ink, mimeograph, stationery, typewriting, carbon)
Paper fasteners
Pencils
Penholders
Pens—writing and lettering
Pins
Printed forms—all kinds
Rubber bands
Rulers
Signals—for filing
Show-card ink
Stencils—mimeograph
Styluses
Thumb tacks and push pins
Typewriter oil
Typewriter ribbons
Varnish—mimeograph
Waste baskets

II. Instructional Service

A. General and Commercial

Bill heads
Blackboard compasses
Blackboard erasers
Blackboard pointers
Blank books—stenographic
Blotters—large and small
Book binding tape
Book covers
Bookkeeping forms—journal, ledger
Brushes—show-card and typewriter
Cards—filing
Cards—flash
Cash books
Class record books
Compasses
Cord
Crayons—all kinds
Dermax
Envelopes—all kinds
Erasers
Files—letter
Folders—for filing
Gelatine sheets
Glue, paste, and mucilage
Gummed labels, stars, etc.
Gummed patches
Ink—all kinds
Labels—gummed and other
Manuscript covers
Mending tissue
Notebooks—all kinds
Notebook covers
Notebook fillers
Notebook rings and fasteners
Paper—all kinds (pencil, ink, mimeograph, stationery, typewriting, carbon)
Protractors
Tape—gummed in colors
Yardsticks

[2] This list is given by Taylor in *School Supply Management.*

B. Drawing Supplies

Blotters
Blue print paper
Bristol board
Brushes
Cardboard
Charcoal
Chinese white
Color sample books
Compo-board
Cork—composition and linoleum
Crayons
Cups
Curve
Denim
Erasers
Envelopes
Fasteners
Inks—all kinds
Leather
Leads
Oil paints
Paper—all kinds
Palettes
Paste
Pens
Portfolios
Profile paper
Rulers
Stencil paper
Straw board
Show-card inks and "Enamelac"
Tags
Tracing cloth
Water colors

C. Home Economics Supplies

Bath brick
Baking sheet
Cleaning compounds
Cloth—cheese
Cloth—dish
Cloth—dustless
Dishmop
Foodstuffs
Gas lighter
Paper napkins
Salt
Soap and soap compounds
Sugar
Pepper
Spices and seasonings

D. Household Arts Supplies

Buckram
Buttons
Cambric
Cord—all kinds
Crochet cotton
Darning cotton
Thread
Flannel
Fasteners—snap
Frames
Straw board
Gingham
Hooks and eyes
Huck
Laces
Lawn
Linen
Muslin
Needles
Patterns
Percale
Pins
Raffia
Rings—small brass
Silk
Sewing designs
Silkateen
Tape
Textiles—wool and other
Yarn

E. Industrial Arts Supplies—Including All Shop Supplies

Alcohol
Basketry materials
Brads
Brushes
Butts
Catch, spring
Chemicals
Clay
Dowels
First-aid supplies
Gasoline
Glue
Handles, door and drawer pulls
Hooks—all kinds
Inks
Insulating fabrics
Iron and steel (raw materials)
Kerosene
Knobs
Lumber
Nails
Oil
Pail
Paints, enamel, varnishes
Paper—all kinds (for print shop)
Paper—sand
Paste—solder
Pulls—drawer
Raffia
Reed
Sand
Screws
Shellac
Solder
Soap
Stain
Tacks
Tape—insulating
Tin
Turpentine
Wall board
Wax
Wire—all kinds
Wood filler

F. Kindergarten Supplies

Balls—rubber
Board—peg
Building blocks
Cards—sewing
Clay
Colored pegs
Colors—tubes
Crayons
Cubes
Flags
Gifts
Laces
Mounting sheets
Needles
Oilcloth
Paper—all kinds
Patty pans
Paste
Peas
Pencils
Pictures—colored
Portfolios
Rings
Sand
Spheres
Sticks—colored
Straws
Toys
Weaving material

G. Music Supplies

Mending tissue
Music—score sheets, etc.
Music—blank sheets
Pitch pipes
Portfolios
Reeds
Rosin
Staff liners
Strings for musical instruments
"T" binders

H. Physical Training Supplies

Balls—base, foot, basket, tennis, playground and the like
Bamboo sticks
Bats
Bean bags
Blank cartridges
Cards—health record
Elastic braces and supports
Enamel—white
First-aid supplies
Gum—chewing
Hockey puck
Hockey stick
Lime
Laces
Liniment
Needles—lacing
Pump—foot and basketball
Rope—jumping
Shoes
Score books
Uniforms—foot, basket, baseball, track
Whistles

I. Scientific Supplies

Alcohol
Batteries
Beakers
Bottles
Brushes
Clamps—test tube
Chemicals — elements, acids, bases, salts
Cylinders—glass, graduate
Filings—iron, copper, brass
First-aid supplies
Flasks
Foodstuffs—for testing
Gasoline
Gauze—wire
Glass plates
Glass tubing
Glucose
Kerosene
Paper—filter
Paste—solder
Paraffin
Pinch clamps
Porcelain ware—dishes and crucibles
Retorts—glass
Rods—glass
Rosin
Solder
Test tubes
Thistle tubes
"U" tubes—glass
Tubing—rubber
Watch glasses
Wax

J. Special Classes

(See lists under General and Commercial, Home Economics, Household Arts, and Industrial Arts.)

III. Operation of Plant:

A. Janitor's Supplies

Ammonia
Bon Ami
Brushes
Chamois
Cheesecloth
Cleaning compounds
Deodorizers
Disinfectants
Dusting brushes
Floor oils
Lubricating oils
Lye
Nails
Pails
Paints, varnishes, and enamels
Scouring compounds
Screws
Soaps
Sweeping compound
Towels
Wax

IV. Auxiliary Agencies:

A. Medical and Dental Supplies

Absorbent cotton
Adhesive tape
Antiseptic bandage
Aromatic spirits of ammonia
Camphenol
Camphenol solution
Dental floss (all kinds)
Dental napkins
Disclosing solution (Skinner)
Drinking cups (paper)
Emergency gauze
Emergency splints
Flour of pumice
Glycerine
Hydrogen peroxide
Iodine
Medicine applicators
Orange wood points
Potassium iodide
Tincture of iodine
Tongue depressors
Tourniquet
Towels (paper)
Zinc iodide

B. Lunchroom Supplies. (See Domestic Science Supplies.)

Decorations for tables
Foodstuffs
Paper towels
Paper napkins
Soap

C. Library Supplies. (See Office Supplies.)

Cards, catalog, and library record
Covers—book
Ink
Labels
Stamp pad
Printed forms

Even with the degree of care that has been used in selecting the materials, the index is still a crude measuring device. The excuse for presenting the index at this time is that it may lead to a better one.

The index for some months past is given in Table VII.

TABLE VII—INDEX OF SCHOOL SUPPLY PRICES
(1926=100. Based upon materials)

1928			
September	95.0	February	94.7
August	94.9	January	94.9
July	94.5		
June	94.2	1927	
May	93.7	December	94.8
April	93.8	November	95.0
March	94.3	October	95.2

Results and Conclusions. There are some unusual difficulties in constructing an index of school supplies. The great variety of school supplies with the resulting variety of materials from which the supplies are made constitutes a difficulty of the first order. Some of the materials from which school supplies are made are not important in the commercial world and for that reason price quotations are difficult to obtain. With all the difficulties, the results to be derived from an index of school

supply prices would seem to justify whatever effort is necessary to make the index.

Of the two indexes presented, the one based upon the price of materials entering into school supplies is by far the more valuable. One reason for the greater value of the index based upon material is that such an index can be published each month.[3] After a period of trial the index should prove of value not only in showing the present level of school supply prices but also in indicating the direction of future price changes.

[3] Anyone interested in the index each month can find it in *The Nation's Schools.*

Bulletins of the School of Education, Indiana University*

THE following list includes only publications which have been issued as a part of the series of *Bulletins of the School of Education.* As this series was not begun until 1924, publications of the School of Education before that date are not included in this list. These were published thru the Extension Division, Indiana University.

Proceedings of the High School Principals' Conference (November 23 and 24, 1923).
Vol. I, No. 1, September, 1924. Price, 50 cents.

Investigation of Nursing as a Professional Opportunity for Girls. Florence E. Blazier.
Vol. I, No. 2, November, 1924. Price, 50 cents.

Eleventh Annual Conference on Educational Measurements (April 18 and 19, 1924).
Vol. I, No. 3, January, 1925. Price, 50 cents.

Proceedings of the High School Principals' Conference (November 14 and 15, 1924).
Vol. I, No. 4, March, 1925. Price, 50 cents.

First Revision of Bibliography of Educational Measurements.
Vol. I, No. 5, May, 1925. (Supply exhausted.)

Twelfth Annual Conference on Educational Measurements (April 17 and 18, 1925).
Vol. I, No. 6, July, 1925. Price, 50 cents.

The Effect of Population upon Ability to Support Education. Harold F. Clark.
Vol. II, No. 1, September, 1925. (Supply exhausted.)

Proceedings of the High School Principals' Conference (November 20 and 21, 1925).
Vol. II, No. 2, November, 1925. Price, 50 cents.

A Cross-Indexed Bibliography on School Budgets. Harold F. Clark.
Vol. II, No. 3, January, 1926. Price, 50 cents.

A Comparison of the Results Made on Certain Standardized Tests by Pupils in the Bloomington High School, Who were Taught in Classes of the Same Grade by University Student Teachers and by Regular High School Teachers. Carl G. F. Franzén.
Vol. II, No. 4, March, 1926. Price, 50 cents.

Thirteenth Annual Conference on Educational Measurements (April 16 and 17, 1926).
Vol. II, No. 5, May, 1926. Price, 50 cents.

* Volume IV, Nos. 2 and 3, may be secured thru the Bureau of Coöperative Research, School of Education, Indiana University. All others may be secured from the Indiana University Bookstore, Bloomington, Indiana.

When to Issue School Bonds. Harold F. Clark and Paul Royalty.
Vol. II, No. 6, July, 1926. Price, 50 cents.

Students' Attitude toward Examinations. Grover T. Somers.
Vol. III, No. 1, September, 1926. Price, 50 cents.

Proceedings of the High School Principals' Conference (November 12 and 13, 1926).
Vol. III, No. 2, November, 1926. Price, 50 cents.

Index Numbers in School Administration. Harold F. Clark.
Vol. III, No. 3, January, 1927. Price, 50 cents.

Topical Analysis of 234 School Surveys. Compiled under the direction of Henry Lester Smith.
Vol. III, No. 4, March, 1927. Price, 50 cents.

Fourth Annual Conference on Elementary Supervision (April 14, 1927).
Vol. III, No. 5, May, 1927. Price, 50 cents.

Fourteenth Annual Conference on Educational Measurements (April 15 and 16, 1927).
Vol. III, No. 6, July, 1927. Price, 50 cents.

Some Phases of the Junior College Movement. I. Owen Foster, Harold F. Clark, Willard W. Patty, and Leo M. Chamberlain.
Vol. IV, No. 1, September, 1927. Price, 50 cents.

Second Revision of the Bibliography of Educational Measurements. Henry Lester Smith and Wendell W. Wright.
Vol. IV, No. 2, November, 1927. Price, 75 cents.

A Bibliography of School Buildings, Grounds, and Equipment. Henry Lester Smith and Leo Martin Chamberlain.
Vol. IV, No. 3, January, 1928. Price, 75 cents.

Proceedings of the High School Principals' Conference (November 18 and 19, 1927).
Vol. IV, No. 4, March, 1928. Price, 50 cents.

The Economic Effects of Education. Harold Florian Clark.
Vol. IV, No. 5, May, 1928. Price, 50 cents.

Fifteenth Annual Conference on Educational Measurements (April 20 and 21, 1928).
Vol. IV, No. 6, July, 1928. Price, 50 cents.

Fifth Annual Conference on Elementary Supervision (April 19, 1928).
Vol. V, No. 1, September, 1928. Price, 50 cents.